

RIPARIAN TYPE CLASSIFICATION
OF A PORTION OF
ANTELOPE CREEK, GOOSENEST DISTRICT
KLAMATH NATIONAL FOREST

by

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distribution and field testing

February, 1994

USDA Forest Service, Pacific Southwest Region
Ecology Program

INTRODUCTION

This report is a summary of Riparian Classification data collected in a portion of Antelope Creek, Goosenest District, Klamath National Forest in 1992. The data collected in Antelope Creek is a part of an ongoing classification of riparian areas in National Forest Lands in Northeastern California.

This report summarizes a limited subset of a larger, (and incomplete) data set, and is in no way final.

OBJECTIVES

The objectives of this report are to:

1. Summarize riparian classification data collected to date in the sampled portion of Antelope Creek.
2. Discuss riparian plant communities identified to date, including species composition, edaphic features, and physiographic features. Present this information in a manner that will assist in the Riparian Inventory in progress on part of the Antelope Creek.
3. Describe successional trends where known.
4. Provide management guidelines or implications, where known.

DEFINITIONS

Aquatic system: The stream channel or lake bed, the water, and the biotic communities associated with them, forming an interacting system.

Community type: An aggregation of similar plant communities distinguished by floristic and structural similarities in both understory and overstory layers. A unit of vegetation within a classification.

Graminoid: Grass or grass-like plant, e.g., Poa, Glyceria, Carex, Juncus species.

Plant community: An assemblage of plants occurring together at any point in time, thus denoting no particular ecological status. A unit of vegetation.

Riparian ecosystem: That ecosystem (typically located between aquatic and terrestrial situations) identified by soil characteristics associated with at least seasonally (and possibly historically) high water tables (e.g., mottles or gleyed soils), and with distinctive vegetation that requires free or unbound water.

Seral: Refers to species or communities that are eventually replaced by other species or communities.

State: Refers to an existing or projected "state" of vegetation

Stable: The condition of little or no perceived change (from a human timeframe reference) in plant communities that are in "relative equilibrium" with existing environmental conditions. Describes persistent stages in plant succession.

Transition: Application of time or specific disturbance in a successional context

Wetland communities: Plant communities that occur on sites with soils typically saturated with or covered with water most of the growing season.

METHODS

Procedures followed were those outlined in the Zone 2 Riparian Target Ecosystem Revisions to Ecosystem Classification Handbook, on file at the Modoc National Forest, Alturas, CA.

OFFICE METHODS

Plant specimens not identified in the field were identified in the office or sent to various botanists for identification.

Soils were classified to family level using standard pedon description methods (USDA-SCS 1975).

Data were entered into a computer data base, and summarized for preliminary analysis. Preliminary analysis to date includes classification and ordination via the Cornell Ecology Package, and direct gradient analysis of categorical variables via Canonical Correspondence Analysis.

GENERAL SETTING

Antelope Creek is a perennial stream that flows in a northerly direction from the Cascade range at the southern end of the Goosenest District, through the town of Tennant, and ultimately into a volcanically fractured sink area near Butte Valley. A fenced portion of the creek at 5400-5600 feet was sampled in 1992. The valley the creek flows in has been glaciated, and soils of metamorphic, volcanic, and sedimentary origin can be found. The creek in most places is 10-15 feet wide in mid-summer, and is a Rosgen C4 for most of the sampled length. There are numerous springs and seeps along the creek within the creek valley bottom. Vegetation in the creek vicinity is dominated by coniferous and hardwood forest consisting of white fir, red fir, ponderosa pine, and aspen. The watershed has been extensively logged, and until recently, the area of the creek was grazed by domestic livestock on a season-long basis.

PRELIMINARY CLASSIFICATION

A total of 18 "possible community types" were sampled. Several of these have analogs in other riparian classifications, and these are referenced where appropriate.

Community types are summarized as follows:

<u>Community Type</u>	<u>Longevity</u>	<u>Indicates</u>
<u>TREE-DOMINATED COMMUNITIES</u>		
1. ABCO-POTR3	fl	POTR3 initially dom.; ABCO succ.
2. ABCO/SALIX	fl	Intermediate betw. ABCO and SALIX
3. ABCO/VECA	fl	High VECA density often rel. to grazing practices
4. ABCO/PICO1	fl	ABCO will eventually dominate
<u>SHRUB-DOMINATED COMMUNITIES</u>		
5. ALTE-SALIX	st	CAAQ indicates deeper soils within the type. Some sites have Salix only
<u>HERBACEOUS COMMUNITIES</u>		
6. Pioneer bar communities	fl	Dominated by MIGU; mesic grams and forbs. Short-lived.
7. AGAL	st	2nd terraces; rel. dry sites
8. POPR1	st	dry sites; well drained
9. CAIN4	st	Slightly wetter site than POPR1.
10. CAAQ	st	Moist site; intermediate between CAIN4 (dry) and SCCO (wet) sites. Susceptable to overgrazing
11. JUBA	st	Very dry, often overgrazed or otherwise disturbed/artificially dry sites

12. PUPA2	fl	Emergent bank building pioneer. Often replaced by sedges within 5 yrs if not disturbed
13. ELPA6	fl	Emergent; moist sites
14. CARO2	st	Wet, high organic matter
15. CASI1	st	Favors spring-fed sites; high organic matter
16. VECA	st	Threshold disturbance; very stable once established. Check for aspen logs
17. SCCO	st	Favors wet sites
18. MESIC GRAM/FORB	fl	Meadow edges

Status codes:

st = "stable", or relatively long-lived

fl = "fluid", or relatively short lived

DESCRIPTIONS OF COMMUNITY TYPES

Note: Stream type for all of the sampled area was a ROSGEN C-4.

1. ABCO-POTR3/CAAQ, white fir-aspen/aquatic sedge

This community was sampled from 2 to 120 feet of the Antelope Creek streambank, and from 5 to 36 feet above the moving water level. Water table at the time of sampling was very deep, with a moderately deep capillary fringe of 8 to 25 inches. Soils are mostly well drained. Soils have no coarse fragments, and organic matter depth is 1 in. or less. "A" horizon thickness was slightly higher in the stands dominated by aspen. Water supplies to these sites is from capillary soil moisture, and soils vary from dry to wet throughout the season. Tree vegetation consists of white fir and aspen; in varying stages of dominance. White fir is successional to aspen in this type unless the fir is removed by cutting or by burning. Shrub vegetation is sparse, although some alder or serviceberry may be found. California false hellebore has high constancy and potentially high cover values, and aquatic sedge was found in all of the sampled stands. California false-hellebore is probably an indicator of past aspen sites. This community type is slightly wetter than a pure false hellebore site or an ABCO/VECA community type, and aspen is the indicator of wetness.

Transition

State

No disturbance
Underburn
Stand replacing burn
Season long grazing
Selective thinning

Tends toward white fir
Favors aspen
Favors aspen
Favors white fir and Veratrum
Favors aspen, short term

2. ABCO/SALIX, white fir/willow

This community type was sampled at some distance from and above Antelope Creek. Soils are deep, and capillary fringe is at about 17 inches. Soils are well drained, and are not rocky. Overstory vegetation is white fir; shrub vegetation consists of lemmon willow and whiplash willow. Kentucky bluegrass has high cover in the herbaceous understory. This type grows on a wetter site than ABCO/POTR3/CAAQ, and on a slightly dryer site than the pure ALTE-SALIX stands.

Transition

State

No disturbance

Underburn
Stand replacing burn
Season long grazing
Selective thinning

Eventual white fir dominance (?);
higher cover of whiplash willow
Willow regen, initially
Willow regen
Favors lemmon willow
Favors lemmon willow

3. ABCO/VECA, white fir/false hellebore

This community type is closely related to, and slightly dryer than, the ABCO/POTR3/CAAQ community type. This community type may be another "state" of the same ecological type, and the transition leading to this state is probably a combination of livestock grazing, time, and lack of fire. Chances are fairly good that this community type was historically an aspen stand. VECA is observed to be disturbed-successional to aspen in other locations. Overstory vegetation is white fir, with an understory of false hellebore and self-heal (introduced forb Prunella vulgaris).

Transition

State

No disturbance
Underburn
Stand replacing burn
Season long grazing
Selective thinning

White fir community
?. Might favor aspen
Aspen?
White fir
Veratrum

4. ABCO-PICO1/CAAQ, white fir-lodgepole

This community type is dominated by lodgepole pine, with white fir regeneration. The sparse shrub understory consists of Ribes lacustre, Amelanchier pallida, or mountain alder. Herbaceous vegetation consists of false hellebore, Trifolium repens, redtop, water sedge, and small-headed sedge. Site moisture is equivalent to slightly wetter than the ABCO-POTR3/CAAQ community type sites. Capillary fringe depth varies from 1 to 15 inches, and drainage is relatively poor. Maximum and minimum water table levels range from 15 to 70 inches. "A" horizon ph is somewhat acidic compared to the community

types with aspen. Unless removed or burned, white fir will eventually dominate this community type.

Transition

State

No disturbance

White fir

Underburn

Can go either way

Stand replacing burn

Favors lodgepole

Season long grazing

Favors nonpalatable forbs such as
Veratrum

Selective thinning

Favors understory veg

5. ALTE-SALIX, mountain alder-willow

This community type consists of varying percentages of Alnus tenuifolia, Salix lasiandra caudata, and Salix lemmoni. Stands dominated by alder are generally closer to the streamside, have shallower soils, and are wet throughout the growing season. Stands dominated by Salix lasiandra can occur farther away from the stream, may have deeper soils, higher clay percentage, and lower coarse fragment percent, which suggests more soil development in these sites. Both Salix lasiandra and alder-dominated sites are wetter throughout the season than are lemmon willow-dominated sites. Lemmon willow sites are otherwise very similar environmentally to Salix lasiandra sites. A hypothesis for these stands might be:

Alnus tenuifolia: Wet, gravelly, relatively shallow soils with low clay percentages; good drainage.

Salix lasiandra: Wet, well developed soils with clay horizons; high cover of Carex aquatilis.

Salix lemmoni: Early wet; drying later in the season; moderate clay percentage; relatively deep soils, moderately high cover of Carex aquatilis.

More observations are needed to verify and fine-tune these hypothesized environmental relationships.

Transition

State

No disturbance

More representation of younger age classes; species diversity

Underburn

Shrub regen (?)

Stand replacing burn

Shrub regen

Season long grazing

Mature, eventually decadent shrub communities w/ little regen

6. Pioneer bar communities

One bar community was sampled; dominated by Mimulus guttatus and Agrostis exarata. Other species include Puccinellia, Glyceria, and jones sedge. This site was located in the Antelope Creek channel, and, as expected, water level and gravel content are high. Salix and Alnus can be expected to eventually dominate these pioneer sites.

Transition

State

No disturbance, short-term	<u>Carex aquatilis</u>
No disturbance, longer-term	ALTE-SALIX
Season-long grazing	Tends to maintain dynamic bar community

7. AGAL, redtop

Agrostis alba communities are situated on terrace landforms with deep water tables and capillary moisture inputs. Redtop is an introduced species, as are several of the cohorts in this community type. The herbaceous layer is dominated by Agrostis alba, with lesser amounts of Kentucky bluegrass, alpine timothy, aster, and common dandelion. Grasslike plants with high constancy consist of small-headed sedge and baltic rush. The type has a 1- to 2 inch organic surface layer, and the capillary fringe depth is at about 4 inches. Drainage is relatively poor. These sites are quite close in ordination space to sites dominated by Carex integra, a native species, and there may be a transition relationship between the two community types.

<u>Transition</u>	<u>State</u>
No disturbance	Maintains as is (?)
Raise water table	<u>Carex</u> dominance more apparent initially; eventual <u>Salix</u> potential
Season-long grazing	JUBA in extremely deteriorated state

8. POPR1, Kentucky bluegrass

Kentucky bluegrass is a prominent introduced naturalized species that grows on seasonally dry meadow sites. Moisture input is by capillary flow, and these sites dry after early season saturation. The depth of capillary fringe in the type is about one inch, and the type has a shallow organic layer. Water table level varies from about 16 to 36 inches deep, and these particular sites were poorly drained. These sites apparently have willow potential as trace amounts of willow regen were found in the plots. In ordination space these plots are intermediate in wetness between Veratrum californicum (VECA), and sites with aquatic sedge. Associated species include common dandelion, horsetail, yampah, redtop, timothy, mannagrass, and small-headed sedge.

<u>Transition</u>	<u>State</u>
No disturbance	<u>Salix</u> ; possibly aspen
Season-long grazing	JUBA; possibly VECA w/ extreme deterioration

9. CAIN4, Carex integra

Carex integra is a dryland cespitose sedge that occupies sites in ordination space very similar to sites dominated by Agrostis alba. Water tables and capillary fringes are deep, and soils dry out after early season saturation. Water inputs to soils are by precipitation or by capillary flows. Associated

species include Kentucky bluegrass, Columbia needlegrass, California oatgrass, and redbtop.

Transition

State

No disturbance

Maintains as is

Season-long grazing

VECA; POPR1; AGAL are possibilities

10. CAAQ, Carex aquatilis

Carex aquatilis, or aquatic sedge, occupies wet sites that usually flood annually and are wet throughout the growing season. Water inputs are from capillary flows and surface sheet flows. Capillary fringe depth is 1 to 2 inches, and soils are poorly drained. Maximum water levels are near the surface, and minimum water table levels are 6 to 20 inches. Soil temperature in the sample plots was 59 degrees farenheit, relatively high for the data set. Aquatic sedge is the herbaceous dominant. Trace amounts of other woody and herbaceous species may be present. The sample plots had trace canopies of whiplash willow and mountain alder, as well as aspen. Other associated vegetation includes Kentucky bluegrass, mannagrass, redbtop, Puccinellia paucifolia, Scirpus congdonii, Carex jonesii, and small-headed sedge.

Transition

State

No disturbance

Maintains

Raise water table

Carex rostrata; SCCO(?)

Season long grazing

JUBA w/ extreme deterioration, or mesic gram/forb

11. JUBA, Baltic rush

Baltic rush community type is a dry meadow type that often indicators past or current overgrazing disturbance. Water tables and capillary fringe are usually deep, and there is no organic soil horizon. Soils dry during the season, and water inputs are from precipitation or from capillary flows. In ordination space, this type is the driest herbaceous community sampled in Antelope Creek.

Baltic rush is usually the dominant species, with highly varying kinds of associated vegetation. Mature Baltic rush is unpalatable to livestock, although the rhizomes have some soil holding and bank stabilizing properties. Associated species include Carex integra and forbs such as Epilobium and long-stalked clover.

Transition

State

No disturbance

CAIN4; POPR1(?)

Raise water table

CAAQ, at least initially

Season-long grazing

Maintains as is

12. PUPA2, Puccinellia paucifolia

Puccinellia communities were observed where the water table was at or above ground level. Canonical correspondence analysis of categorical and continuous variables suggested that Puccinellia community type has an affinity for the

Aquatic landform, and for sites with surface sheet flowing or ponded water. Puccinellia communities are pioneer on soft mud bars, and are sensitive to livestock grazing and trampling. Puccinellia is a rhizomatous species, and a good sediment catcher. The most prominent associated species was aquatic sedge.

<u>Transition</u>	<u>State</u>
No disturbance	CAAQ, initially; eventually ALTE-SALIX (?)
Season-long grazing	Pioneer bar community, or raw bank

13. Eleocharis paucifolia, Few-flowered spikerush

This type occurs sporadically throughout the study area, in sites that are very wet but not necessarily submerged throughout the season. The community type was strongly associated in ordination space with hydrostatic spring flows and with surface sheet water flows, as is Carex simulata. Associated herbaceous vegetation was Carex simulata. Trace amounts of huckleberry and bog birch were found in the type, as was a relatively uncommon sedge Carex ormantha.

<u>Transition</u>	<u>State</u>
No disturbance	maintains, or possibly CASI or SCCO
Season-long grazing	maintains (?)

14. Carex rostrata, Beaked sedge

Beaked sedge occurred in wet, season-long saturated areas with flowing water. The sample plots did not have organic horizons. Species richness in the type is often low. Associated species include Agrostis sp., small-headed sedge, and Jones' sedge.

Beaked sedge thrives in sites too wet for aquatic sedge, and is a valuable community for streambank stability and to provide overhanging banks for fish habitat. The type is readily lost by alteration of the water table. Streamside aquatic sedge communities in recovering riparian ecosystems may eventually convert to beaked sedge communities, where water tables are high. The type can also occur in conjunction with heavy organic soils.

<u>Transition</u>	<u>State</u>
No disturbance	Maintains
Season-long grazing (w/ lowered water table)	CAAQ, or pioneer bar

15. Veratrum californicum, False-Hellebore

False-hellebore community type in Antelope Creek occurs on dry meadow edges. Mode of water input is through capillary flows, and the stands remain moist throughout the growing season. Associated species include the caespitose dryland sedges Carex microptera and Carex interior.

False-hellebore is unpalatable and toxic to livestock. Extensive stands of false-hellebore often indicate profound overgrazing disturbance at some time in the present or past. Aspen logs are commonly found in hellebore stands, suggesting a conversion, perhaps one-way, from aspen to false-hellebore. This is somewhat supported by the position of false-hellebore in ordination space, which is adjacent to aspen. Hellebore stands seem to be extremely stable and long-lived.

Transition

State

No disturbance

maintains, or, aspen?

Season-long grazing

maintains; expands

16. Carex simulata, short-beaked sedge

Short-beaked sedge associations were observed in areas that have water tables and capillary fringe at or close to surface level. The sample sites received most of their water supply from upstream or spring flows, and the sites stay wet through the season. Short-beaked sedge stands were associated with spring/seeps, and perennially wet portions of the Antelope Creek meadow. Coarse fragments were absent from the upper soil horizons. The most prominent associated species are aquatic sedge and Scirpus congdonii.

Carex simulata stands form dense swards that appear to be stable. Carex simulata is not palatable to livestock, although the wet swards can be disturbed by trampling. These stands are often bouncy when walked upon. They can be adversely affected by lowering the water table.

Transition

State

No disturbance

maintains

Season-long grazing

POPRI; JUBA if site is dried out

17. Scirpus congdonii, Congdon's bulrush

Scirpus congdonii occupies extensive areas of the Antelope Creek meadow that receive input water flows from upstream or upslope sources, and where water supply is constant throughout the season. Capillary fringe depth is near the surface. In ordination space, these sites are very similar to those occupied by Carex simulata and Eleocharis paucifolia. Associated species include Eleocharis paucifolia, Carex simulata, and Carex aquatilis.

Transition

State

No disturbance

Maintains (?)

Season-long grazing

(?)

18. MESIC GRAM/FORB

This community type was sampled on the Antelope Creek meadow edge, juxtaposed between true fir forest (Abies magnifica-Abies concolor) and the PICO-ABCO/CAAQ community type. The type is dominated by forbs such as Mimulus primuloides and grasses such as Muhlenbergia filiformis. Grasslike plants present include Carex aquatilis and Carex muricata. Plant composition suggests that this

community is a "grazing disclimax", and that capability exists for higher sedge cover. The community probably developed with season-long continuous livestock grazing. These sites receive moisture mostly from capillary flows, and soils dry after early season saturation.

Transition

State

No disturbance
Season-long grazing

CAAQ, initially
Maintains, or JUBA (?)

USEFUL REFERENCES (partial list)

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APPENDICES

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| Appendix A | Diagram, Detrended Correspondance Analysis (DECORANA); associated with environmental variables |
| Appendix B | Diagram, Canonical Correspondence Analysis (CANOCO) |
| Appendix C | List of species and common names |